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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/649,577	08/26/2003	Douglas A. Hawks	0140153	5977

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EXAMINER
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TRINH, MICHAEL MANH

ART UNIT	PAPER NUMBER
2822	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/26/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

## Office Action Summary

**Application No.**

10/649,577

**Applicant(s)**

HAWKS ET AL.

**Examiner**

Michael Trinh

**Art Unit**

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 09 April 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-8, 16, 17 and 20-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 16, 17 and 20-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

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## DETAILED ACTION

\*\*\* This office action is in response to Applicant's Amendment filed on April 09, 2007.

Claims 1-8,16,17,20-27, and 28 are pending.

\*\*\* The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

### *Claim Rejections - 35 USC § 102*

1. Claims 1,16,20,24,26 are rejected under 35 U.S.C. 102(b) as being anticipated by Landi (4,944,087).

Re claim 1, Landi teaches (at Figs 5,1-4; col 4, line 6 through col 7) a method for forming a package for an electrical device, the method comprising the steps of laminating to attach a removable material 16 (Figs 5, step 1; Figs 1-4; col 4, line 7-54; col 5, lines 1-35; col 6 lines 14-50) to a surface of a conductive material (col 5, lines 12-17; col 4, lines 7-54; col 2, lines 6-65), wherein the removable material 16 comprises a polyimide material and a soluble adhesive (col 5, lines 12-35; col 6, lines 14-50; col 7, lines 38-51); forming isolated conductive features 14 within said conductive material (Figs 5,1-4, step 2; col 4, lines 34-40; 10-55; col 5, lines 10-17; col 7, lines 1-13; col 2, line 46 through col 3); attaching encapsulant to the isolated conductive features and the removable material by molding (Fig 5, steps 4-5; col 4, lines 36-54; col 5, line 35 through col 6); and removing the removable material from the conductive features and the encapsulant (Fig 5; steps 5-6; col 4, lines 49-54; col 5, lines 1-35; col 6, lines 14-50; col 7, lines 39-51). Re claim 16, wherein the removable material 16 is used and acted as a molding stencil during molding of encapsulant (Fig 5; steps 5-6; col 4, lines 49-54; col 5, lines 1-35; col 6, lines 14-50; col 7, lines 39-51). Re claim 20, wherein the conductive material of metal comprises a metal frame sheet of solid film (Figs 5,1-4; col 5, lines 12-17; col 2, lines 6-65; col 4, lines 7-54; col 5, lines 1-35; col 6 lines 14-50). Re claim 24, wherein the metal frame comprise a metal sheet of solid film (Figs 5,1-4; col 5, lines 12-17; col 2, lines 6-65; col 4, lines 7-54; col 5, lines 1-35; col 6 lines 14-50). Re claim 26, wherein the removable material 16 covers substantially the entire bottom surface of the metal lead frame sheet of solid film before lithographically patterning to form patterns 14 (Figs 5,1-4; col 5, lines 12-17; col 2, lines 6-65; col 4, lines 7-54; col 5, lines 1-35; col 6 lines 14-50).

***Claim Rejections - 35 USC § 103***

2. Claims 1-6,16,20-26,27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fjelstad (6,001,671) taken with Landi (4,944,087).

Re claim 1, Fjelstad '671 teaches (at Figs 2A-2E,2F, col 5, lines 26-65; Figs 1A-1G-1,1D-3; col 1-5; col 3, line 53 through col 5) a method for forming a package for an electrical device, the method comprising the steps of attaching a removable material (100',115' in Fig 2A; 100 in Fig 1) to a surface of a conductive material 101 (Fig 2A; col 5, lines 26-65), wherein the removable material of polyimide, polymer material, polyetherimide, fluropolymer can be soluble and dissolving in a specific etching solution (col 5, lines 60-65); forming isolated conductive features (110' in Figs 2B,2F; 110 in Figs 1B,1D-3) within said conductive material; attaching encapsulant (140' in Fig 2D; 140 in Fig 1E) to the isolated conductive features 110',115',110 and the removable material; and removing the removable material from the conductive features 110',115',110 and the encapsulant (Figs 1E-1F; col 4, line 66 through col 5; Fig 2F, col 5, lines 60-65; Fig 2E, col 5, lines 45-65). Re claim 2, wherein the step of forming isolated conductive pad features includes patterning and selectively etching of a metal deposit layer using photolithographic technique (col 5, lines 26-40; Figs 2A-2B), which photolithographic techniques is inherently performed by patterning a surface of the conductive material with a material resistant to an etchant and etching the conductive material with the etchant. Re claim 3, wherein a die attach pad 115' is formed within said conductive material (Figs 2A-2C). Re claim 4, wherein the device 120' is coupled to said die attach pad 115' (Figs 2C). Re claim 5, wherein an input/output portion of the device 120' is electrically coupled to said isolated conductive feature 110' (Figs 2C,2F,1D-3). Re claim 6, wherein the method further comprises the step of singulating individual packaged devices (Figs 1F,1G-2; col 5, lines 10-65). Re claim 16, wherein the removable material 100',100 is used and acted as a molding stencil during molding of encapsulant 140',140 (Fig 1E;2D; col 4, lines 56-65; col 5, lines 26-65). Re claim 20, wherein the conductive material 101',101 of metal deposit comprises a metal frame sheet (Figs 2A-2F,1D-1F). Re claim 21, wherein the conductive material of metal deposit film comprises and acts as a metal leadframe (Figs 2A-2F,1A-1F, Figs 1D-3). Re claim 22, wherein die attach pad 115' is not offset from the isolated conductive features 110' (Figs 2B-2C;2F;1D-3). Re claim 23, wherein a single row of connectors 110',110 is formed around perimeter of the

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leadframe (Figs 2F,2B,1D-2). Re claim 24, wherein the metal frame comprise a metal sheet by metal deposition (Fig 2A; col 5, lines 26-45). Re claim 25, wherein multiple rows of connectors 110,110' are formed around a peripheral of the metal sheet (Figs 1D-3, 2B,2F; col 4, lines 1-31). Re claim 26, wherein the removable material 100,100' covers substantially the entire bottom surface of the metal lead frame (Figs 2A-2F,1C-1E). Re claim 27, wherein the electronic device 120' is coupled to the die attach pad 115' via a conductive epoxy (Fig2C,1C; col 5, lines 35-45; col 4, lines 32-45).

Fjelstad already discloses (at col 5, lines 60-65,27-65; Figs 2A-2E) the removable sacrificial material 100' of polymer sheet attached to a layer of conductive copper material 101', wherein the entire polymer removable sacrificial sheet 100' can be removed by chemically dissolving the sheet and is soluble.

Fjelstad thus lacks mentioning the removable material comprising an soluble adhesive.

However, Landi teaches (at Figs 5, step 1;; col 5, lines 1-35; col 6 lines 14-50; col 2, lines 6-65; Figs 1-4; col 4, line 7-54) employing a removable material comprising a soluble adhesive in order to laminate and attach the removable material comprising the soluble adhesive to a surface of a conductive material, wherein the removable material 16 comprises a polyimide material and a soluble adhesive (col 5, lines 12-35; col 6, lines 14-50; col 7, lines 38-51), wherein the removable material comprising the soluble adhesive is removed by dissolving the adhesive with a solvent after molding to encapsulate the circuit pattern with an encapsulant.

Therefore, the subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made to attach the removable material layer 100' to the film of conductive material 101' of Fjelstad by employing a removable material comprising a soluble adhesive for attaching to the conductive material, as taught by Landi. This is because of the desirability to surely adhere the removable material to the conductive material, and to improve the adhesion in order to laminate and attach the removable material comprising the soluble adhesive to a surface of a conductive material. This is also because of the desirability to simplify and facilitate the removal of the removable material comprising the soluble adhesive from the encapsulated device by simply dissolving the adhesive in a solvent.

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3. Claims 7-8 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fjelstad (6,001,671) and Landi (4,944,087), as applied to claims 1-6,16,20-26,27 above, and further of Wyland (6,111,199) and Weng et al (5,972,234).

Fjelstad '671 and Landi teaches a method for forming a package for an electrical device as described to claims 1-6,16,20-26,27 above, and repeated herein. Re further claim 17, Fjelstad '671 also teaches (at col 5, lines 60-65, 26-65; col 7, lines 12-16;) the removable material comprising a polyimide polymer that can be soluble and dissolved in a specific etching solution (col 5, lines 60-65). Landi also teaches (at col 5, lines 15-35, col 6, lines 21-50) the removable material comprising a polyimide and a soluble adhesive.

The references of Fjelstad and Landi already teaches using and removing the removable material comprising the soluble adhesive by simply dissolving the adhesive in a solvent, but lacks mentioning about a water-soluble adhesive (as in claims 7-8,17); deionized water for removing (as in claim 8).

However, *Wyland et al* teach (at col 8, lines 1-10; col 7, lines 54-67) forming a removable adhesive resin film on a substrate, wherein polyimide, alkali-soluble resin, or water-soluble resin are alternatively used for forming the adhesive resin film. *Weng* teaches (col 5, lines 34-37,27-51; and col 4, line 25 through col 5, line 51) the removable material for electronic device comprises a polymeric-base material and a water soluble adhesive, wherein removing the removable adhesive material is performed with deionized water (as a pure water).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the removable material Fjelstad by employing a water-soluble adhesive of resin and polyimide, as taught by Wyland and Weng. This is because the substitute art recognized equivalent removable materials, as alternative materials, is within the level of one of ordinary skill in the art, wherein water-soluble resin material or polyimide are highly adhesive to the terminals of the lead frames, wherein, by using water soluble resin/adhesive, removing the removable materials can be easily and conveniently performed with water, as further taught by Weng, and less expensive, wherein with the use of deionized water, as a high purity water, ion contamination of the device is prevented and thereby improving reliability and quality.

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4. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fjelstad (6,001,671) and Landi (4,944,087), as applied to claims 1-6,16,20-26,27 above, further taken with Roche et al (4,530,152).

The references including Fjelstad '671 and Landi teach a method for forming a package for an electrical device as applied to claims 1-6,16,20-26,27 above, and fully incorporated herein. Fjelstad also teaches attaching the removable material is performed before one or more isolated conductive features 110' have been formed within the conductive material (Fig 2B), wherein attaching an encapsulant (140' in Fig 2D; 140 in Fig 1E) is performed before a singulation process to separate the package; and removing the removable material from the conductive features 110',115',110 and the encapsulant (Figs 1E-1F; col 4, line 66 through col 5; Fig 2F, col 5, lines 60-65; Fig 2E, col 5, lines 45-65).

Re claim 28, the references of Fjelstad and Landi already teach removing the removable material from the conductive features 110',115',110 and the encapsulant (Figs 1E-1F; col 4, line 66 through col 5; Fig 2F,2E, col 5, lines 60-65; 45-65), but lacks mentioning to remove the removable material after the singulation process.

However, Roche teaches removing the removable sacrificial material from the conductive features 2 and the encapsulant 5 (col 3, line 62 through col 4, line 25), wherein the removing the material step can be performed before or after the singulation process for separating the package (col 4, lines 20-25).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to remove the removable material of Fjelstad either after a singulation process to separate the package or prior to a singulation process as alternatively taught by Roche. This is because removing the removable material either after or prior to the singulation process are alternative and art recognized equivalent processes for substitution in fabrication of the electronic device, and because of the desirability to expose a portion of the metal lead frame and conductive features for subsequent electrical connection, wherein by removing the removable material after singulation process, the removable material would still cover and thereby consequently protect the isolated conductive features and metal lead frame from being contaminated during singulation process.

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***Response to Arguments***

**\*\*** Applicant's amendment and remarks filed April 09, 2007 have been fully considered but they are moot in view of the new ground(s) of rejection.

Fjelstad clearly teaches (at col 5, lines 60-65) that "...the entire polymer sheet 100' may simply be removed by chemically dissolving the sheet...". Moreover, the polymer sheet can be dissolved and soluble in a specific chemical etching solution. By using chemical etching to remove the removable material of Fjelstad, the removable material is dissolved and soluble in that chemical etching solution.

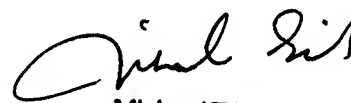
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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael M. Trinh whose telephone number is (571) 272-1847. The examiner can normally be reached on M-F: 9:00 Am to 5:30 Pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on (571) 272-2429. The central fax phone number is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Oacs-15-18

  
Michael Trinh  
Primary Examiner